Method for the Analysis of Phenolic Chemicals on the Drinking Water Contaminant Candidate List (CCL)

What's in the Water?

Ensuring that the nation has a safe supply of drinking water has long been a priority for the EPA. In support of this goal, an analytical method was needed to measure the presence of phenolic contaminants in drinking water at concentrations below the levels of health concern — phenol is a caustic, poisonous compound derived from benzene. The need for this project arose from the recently published Candidate Contaminant List (CCL). The CCL identifies drinking water contaminants that might be regulated by EPA at some future date, and it was developed in response to the 1996 amendments to the Safe Drinking Water Act (SDWA).

This new analytical method will be used to collect nationwide occurrence data for these contaminants in drinking water. Data from this survey will be used in the decision making process for the possible regulation of the phenols listed on the CCL.

The Analytical Method

The approach involved developing procedures for (1) sample collection and preservation, (2) extraction and concentration of the target analytes from aqueous solution, (3) separation of the analytes chromatographically, and (4) detection and quantification of the phenolic compounds. The analytical method developed from this research can be used to measure twelve phenols in drinking water samples. The method detection limits for phenols listed on the CCL range from 0.03 to 0.31µg/L, depending upon the analyte. These concentrations are below those needed for drinking water monitoring, based upon currently available health effects information. This method is an improvement over other published methods for phenols in the following ways: (1) the solid phase extraction procedure requires the use of significantly smaller volumes of solvent than older, liquid-liquid extraction procedures, (2) use of the mass spectrometer as the detector provides positive identification of all method analytes without the use of additional confirmatory techniques, (3) additional quality control procedures such as the use of internal standards and surrogates help to ensure the quality of the data, and (4) the sample preservation protocol ensures sample stability between the time of sample collection and analysis. These improvements will significantly enhance the use of this methodology in the collection of nationwide occurrence data to support regulatory decision making for chemicals on the CCL.

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Benefits

- The efficiency and quality assurance features of this method are an improvement over earlier methods

Purpose

- To develop a method to detect phenols in drinking water in support of the EPA's goal of clean water in support of the SDWA

Accomplishments

- A method was developed to measure the four phenols on the CCL plus eight additional phenols that are of environmental interest
- The method has been published as U.S. EPA Method 528, "Determination of Phenols in Drinking Water by Solid Phase Extraction and Capillary Column Gas Chromatography/Mass Spectrometry (GC/MS)" and is available on the Internet at: http://www.epa.gov/nerlcwww/ordmeth.htm

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For more information visit the National Exposure Research Laboratory Microbiological and Chemical Exposure Assessment Research Division Website: http://www.epa.gov/nerlcwww/mceard.htm

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